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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JOHN W. PETTIT

Appeal 2009-001008
Application 10/735,707
Technology Center 2800

Decided:¹ July 31, 2009

Before CHUNG K. PAK, TERRY J. OWENS, and JEFFREY B.
ROBERTSON, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

DECISION ON APPEAL
STATEMENT OF THE CASE

The Appellant appeals under 35 U.S.C. § 134(a) from the Examiner's rejection of claims 1-95, which are all of the pending claims. We have jurisdiction under 35 U.S.C. § 6(b).

¹ The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, begins to run from the Decided Date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

The Invention

The Appellant claims apparatus and methods for performing measurement on an object. Claim 1 is illustrative:

1. An instrument for performing measurement on an object, the instrument comprising:

a radiation source for generating a beam of radiation, the radiation source comprising (i) a cold cathode, comprising a carbon nanotube material, for emitting electrons and (ii) a target, in a path of the electrons emitted by the cold cathode, for emitting the beam of radiation when struck by the electrons, the cold cathode being controlled to emit the electrons such that the beam of radiation emitted by the target is stabilized; and

a detector, disposed to intercept the beam of radiation after the beam of radiation has been made incident on the object, for detecting the beam of radiation and for outputting a signal representing the beam of radiation.

The References

| | | |
|-----------|-----------------|---------------------|
| Wideröe | 2,798,177 | Jul. 2, 1957 |
| Allport | 4,047,029 | Sep. 6, 1977 |
| Averitt | 4,152,591 | May 1, 1979 |
| Cambier | 5,202,932 | Apr. 13, 1993 |
| Meltzer | 5,280,513 | Jan. 18, 1994 |
| Uhm | 5,410,575 | Apr. 25, 1995 |
| Norton | 5,430,787 | Jul. 4, 1995 |
| Ohno | 5,598,451 | Jan. 28, 1997 |
| Hell | 6,178,226 B1 | Jan. 23, 2001 |
| MacKenzie | 6,252,930 B1 | Jun. 26, 2001 |
| Sturm | 6,377,652 B1 | Apr. 23, 2002 |
| Grodzins | 6,442,233 B1 | Aug. 27, 2002 |
| Takahashi | 6,456,691 B2 | Sep. 24, 2002 |
| Torai | 2002/0141535 A1 | Oct. 3, 2002 |
| Yokhin | 2002/0150209 A1 | Oct. 17, 2002 |
| Faust | 2004/0218714 A1 | Nov. 4, 2004 |
| | | (filed May 2, 2003) |

The Rejections

The claims stand rejected under 35 U.S.C. § 103 as follows:

- 1) claims 1, 2, 9, 11, 12, 33, 40, 42-46, and 95 over Sturm in view of Takahashi;
- 2) claims 3, 4, 10, 17, 20-24, 28, 34, 35, 41, 61-64, 68, 70, and 71 over Sturm in view of Takahashi and Allport;
- 3) claims 5-7, 13-16, 18, 19, 25-27, 36-38, 49-58, and 65-67 over Sturm in view of Takahashi, Allport, and Hell;
- 4) claims 8, 29, 39, and 69 over Sturm in view of Takahashi, Allport, Hell, and Yokhin;
- 5) claims 30, 31, 72, and 73 over Grodzins in view of Takahashi;
- 6) claims 32 and 74 over Grodzins in view of Takahashi and Averitt;
- 7) claims 33, 47, 48, 72, and 75 over Torai in view of Takahashi;
- 8) claims 49, 59, and 60 over Torai in view of Takahashi and Yokhin;
- 9) claims 76-79 over Wideröe in view of Takahashi;
- 10) claims 80-82 over Ohno in view of Takahashi;
- 11) claims 80 and 83 over Meltzer in view of Takahashi;
- 12) claims 84 and 85 over Meltzer in view of Takahashi and MacKenzie;
- 13) claims 86-89 over Faust in view of Takahashi and Averitt;
- 14) claim 90 over Faust in view of Takahashi, Averitt and Uhm;
- 15) claims 91-93 over Faust in view of Takahashi, Averitt and Norton; and
- 16) claims 91 and 94 over Faust in view of Takahashi, Averitt and Cambier.

OPINION

We affirm the Examiner's rejections.

*Rejections of claims 1, 2, 9, 11, 12, 33, 40, 42-46 and 95
over Sturm in view of Takahashi, and claims 3, 4, 10,
17, 20-24, 28, 34, 35, 41, 61-64, 68, 70, and 71 over
Sturm in view of Takahashi and Allport*

Issue

Has the Appellant shown reversible error in the Examiner's determination that the applied prior art would have rendered prima facie obvious, to one of ordinary skill in the art, a cold cathode controlled to emit electrons such that a beam of radiation emitted by a target struck by the electrons is stabilized?

Findings of Fact

Sturm discloses a system and method "for measuring the concentrations of individual components of mineral additives in a paper web in an on-line paper manufacturing process using a single x-ray source and multiple x-ray detectors, each detector with a different filter" (col. 1, ll. 6-12). "The filters cause the measurement sensitivities of the detectors to vary and hence be tuned for particular mineral additives" (col. 3, ll. 15-17). The single X-ray source is an X-ray tube (col. 5, ll. 48-49).

Takahashi discloses an X-ray generator that "includes a cathode having an emitter made of carbon nanotubes which emits electrons by field emission and thus becomes a cold cathode electron emission source" (col. 2, ll. 16-19). To stabilize the carbon nanotube emitter-emitting current (i.e., tube current) with high accuracy (about 0.1% fluctuation) the Wehnelt 12² potential and the takeoff electrode 18 potential are independently controlled

² Wehnelt 12 is part of electron gun 10 (col. 3, ll. 65-66).

using, respectively, second power supply 44 and third power supply 46 (col. 4, ll. 50-57; col. 5, ll. 9-14).

Allport discloses “apparatus for measuring mass per unit area or thickness of sheet material taking into account the effect of changes in composition from nominal values” (col. 1, ll. 10-13). Localized changes in thickness and material composition are taken into account by measuring backscatter and attenuation of an X-ray beam (col. 3, ll. 12-15).

Analysis

The Appellant argues that “*Takahashi* does not teach that the control over the carbon nanotube field emission can be used to stabilize the x-ray output beam” (Br. 14).

The Examiner finds that *Takahashi*’s control of the electron emission from the carbon nanotubes (col. 4, ll. 50-57; col. 5, ll. 9-14) controls the radiation emitted from the target impacted by the electrons (Ans. 23-24). Since the Examiner’s finding is reasonable and the Appellant has not challenged it, we accept it as fact. *See In re Kunzmann*, 326 F.2d 424, 425 n.3 (CCPA 1964). Accordingly, we are not persuaded by the Appellant’s argument.

The Appellant argues that *Takahashi* does not teach that the control over the carbon nanotube field emission “can be made to be very rapid, at radio frequencies if desired, so that phase locked techniques can be employed if desired to further stabilize the measurement without sacrificing response time of the measurement” (Br. 14).

The Appellant improperly is arguing limitations that are not in the claims. *See In re Self*, 671 F.2d 1344, 1348 (CCPA 1982). Moreover, the argued advantages of the carbon nanotubes appear to be inherent

characteristics of carbon nanotubes. The Appellant's statement that "[t]he nanotube based x-ray tubes are very stable, can be turned on and off at will with no warm-up or stabilization and generate very little waste heat" (Spec. 9:3-5) appears to apply to carbon nanotube based X-ray tubes generally, including that of Takahashi.

The Appellant argues that "*Takahashi* does not teach the use of such a carbon nanotube cold cathode x-ray tube in any type of measuring device, presumably because these advantages were not obvious or not known to be so important to the operation of these devices" (Br. 14).

That argument is not well taken because the Appellant is attacking Takahashi individually when the rejection is based upon a combination of Sturm and Takahashi, Sturm being relied upon for a disclosure of a measurement device (Ans. 25). See *In re Keller*, 642 F.2d 413, 426 (CCPA 1981); *In re Young*, 403 F.2d 754, 757-58 (CCPA 1968). The Examiner finds that the advantages of Takahashi's carbon nanotube based X-ray tube "will be realized in whatever system the x-ray source of Takahashi et al. is employed in [sic], such as the measuring device of Sturm" (Ans. 25). Because that finding is reasonable and the Appellant has not challenged it, we accept it as fact. See *Kunzmann*, 326 F.2d at 425.

The Appellant argues that Takahashi's disclosure that "[t]he takeoff electrode potential is controlled so as to regulate an emitter-emitting electron current (i.e., tube current)" (col. 4, ll. 50-52) "does not provide any mechanism to stabilize the beam current" (Br. 15).

As stated by Takahashi, the tube current (beam current) is stabilized by independently controlling the Wehnelt 12 potential and the takeoff

electrode 18 potential using, respectively, power supplies 44 and 46 (col. 5, ll. 11-14).

The Appellant argues that the symbols in Takahashi's Figure 1 for power supplies 44 and 46 are symbols for fixed voltage sources, and that fixing the voltages does not regulate the electron current (Br. 15).

That argument is contradicted by Takahashi's disclosure that "[t]o stabilize the tube current it is required to control independently the Wehnelt 12 potential and the takeoff electrode 18 potential with the use of the second power supply 44 and the third power supply 46 respectively" (col. 5, ll. 11-14).

The Appellant argues that Takahashi's power supplies 44 and 46 "may be themselves 'controlled' so as to maintain their own voltage in a stable manner, but this does not stabilize the beam current" (Br. 16).

That argument is not persuasive in view of Takahashi's disclosure that the tube current is stabilized by use of power supplies 44 and 46 (col. 5, ll. 11-14).

Regarding Allport, the Appellant argues that the Appellant's claimed invention avoids the need for the complexity of Allport's apparatus (Br. 17).

That argument does not address the Examiner's rationale and explain why it is in error.

Conclusion of Law

The Appellant has not shown reversible error in the Examiner's determination that the applied prior art would have rendered prima facie obvious, to one of ordinary skill in the art, a cold cathode controlled to emit electrons such that a beam of radiation emitted by a target struck by the electrons is stabilized.

*Rejection of claims 5-7, 13-16, 18, 19, 25-27, 36-38, 49-58, and
65-67 over Sturm in view of Takahashi, Allport and Hell*

Issue

Has the Appellant shown reversible error in the Examiner's determination that Hell is compatible with Takahashi?

Findings of Fact

Hell controls "the electron current flowing in an x-ray tube in the form of an electron beam between an electron emitter with focussing electrode and an anode, the emitter being continuously heated during the operation of the x-ray tube wherein the electron beam strikes the anode in a focal spot, and wherein tube voltage is across the electron emitter and the anode" (col. 2, ll. 4-10). "[T]he potential at the focal electrode is pulsed with a pulse frequency between a conducting-state voltage, selected dependent on the desired size of the focal spot and/or the tube voltage, and a blocking or reverse voltage interrupting the electron current to the anode, the pulse width being modulated (adjusted) to control the electron current" (col. 2, ll. 10-16).

Analysis

The Examiner argues that Hell and Takahashi are compatible because Hell discloses low temperature emitters that are the same type as Takahashi's carbon nanotube emitters (Ans. 27).

The Appellant argues that Hell and Takahashi are incompatible because Hell uses a heated electron emitter (Br. 18; Reply Br. 3).

Although Hell heats the emitter (col. 2, ll. 19-20), the emitter is a low-temperature emitter (col. 4, ll. 64-65). Hence, we are not convinced of error in the Examiner's rationale that Hell and Takahashi are compatible because they both use low-temperature emitters.

Conclusion of Law

The Appellant has not shown reversible error in the Examiner's determination that Hell is compatible with Takahashi

*Rejection of claims 30, 31, 72, and 73
over Grodzins in view of Takahashi*

Issue

Has the Appellant shown reversible error in the Examiner's determination that Grodzins discloses measurement?

Findings of Fact

Grodzins inspects an enclosure using one or more energy dispersive detectors that measure radiation coherently scattered by an identified volume of material in the enclosure (Abstract).

Analysis

The Appellant argues that Grodzins discloses only inspection, not weight or thickness measurement (Br. 18-19).

The Appellant's claims 30, 31, 72, and 73 merely require measurement, not weight or thickness measurement, and Grodzins discloses measurement (Abstract).

Conclusion of Law

The Appellant has not shown reversible error in the Examiner's determination that Grodzins discloses measurement.

Other rejections

The Appellant does not provide a substantive argument as to the rejections of claims 8, 29, 39, and 69 over Sturm in view of Takahashi, Allport, Hell, and Yokhin, claims 32 and 74 over Grodzins in view of Takahashi and Averitt, claims 33, 47, 48, 72, and 75 over Torai in view of

Takahashi, claims 49, 59, and 60 over Torai in view of Takahashi and Yokhin, claims 76-79 over Wideröe in view of Takahashi, claims 80-82 over Ohno in view of Takahashi, claims 80 and 83 over Meltzer in view of Takahashi, claims 84 and 85 over Meltzer in view of Takahashi and MacKenzie, claims 86-89 over Faust in view of Takahashi and Averitt, claim 90 over Faust in view of Takahashi, Averitt and Uhm, claims 91-93 over Faust in view of Takahashi, Averitt and Norton, and claims 91 and 94 over Faust in view of Takahashi, Averitt and Cambier (Br. 18-21). We therefore are not persuaded of reversible error in those rejections.

DECISION/ORDER

The rejections under 35 U.S.C. § 103 of claims 1, 2, 9, 11, 12, 33, 40, 42-46, and 95 over Sturm in view of Takahashi, claims 3, 4, 10, 17, 20-24, 28, 34, 35, 41, 61-64, 68, 70, and 71 over Sturm in view of Takahashi and Allport, claims 5-7, 13-16, 18, 19, 25-27, 36-38, 49-58, and 65-67 over Sturm in view of Takahashi, Allport, and Hell, claims 8, 29, 39, and 69 over Sturm in view of Takahashi, Allport, Hell, and Yokhin, claims 30, 31, 72, and 73 over Grodzins in view of Takahashi, claims 32 and 74 over Grodzins in view of Takahashi and Averitt, claims 33, 47, 48, 72, and 75 over Torai in view of Takahashi, claims 49, 59, and 60 over Torai in view of Takahashi and Yokhin, claims 76-79 over Wideröe in view of Takahashi, claims 80-82 over Ohno in view of Takahashi, claims 80 and 83 over Meltzer in view of Takahashi, claims 84 and 85 over Meltzer in view of Takahashi and MacKenzie, claims 86-89 over Faust in view of Takahashi and Averitt, claim 90 over Faust in view of Takahashi, Averitt, and Uhm, claims 91-93 over Faust in view of Takahashi, Averitt, and Norton, and claims 91 and 94 over Faust in view of Takahashi, Averitt, and Cambier are affirmed.

It is ordered that the Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

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